WOOL STUDIES

WASHING BEFORE SHEARING—TIME OF SHEARING

OHIO
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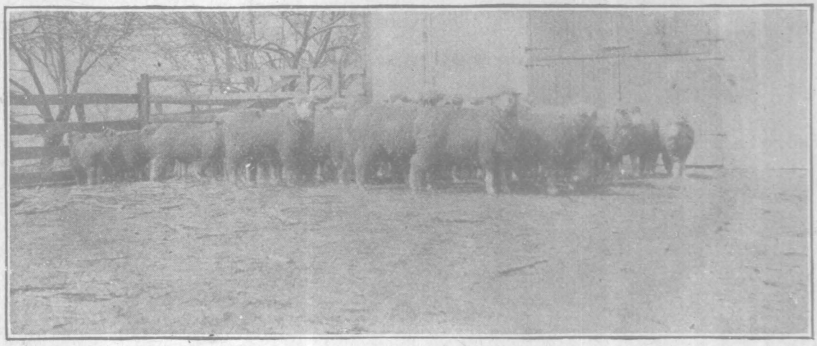

Lambs used in experiment

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BULLETIN
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WASHING BEFORE SHEARING—TIME OF SHEARING

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The practice of washing sheep was brought into Ohio by early settlers from states farther east. The method of washing varies somewhat; usually either the sheep are driven repeatedly through a stream, dammed up if necessary to furnish a sufficient volume of water, or they are held in the water by the attendant and the dirt squeezed out of the wool by hand. While this practice, which was at one time rather general in Ohio, has become almost obsolete in the greater part of the State, it still persists on many farms in the southern and eastern counties, as well as in the bordering territory in the northern Panhandle of West Virginia and in western Pennsylvania.

Object of the experiment.—This experiment was undertaken for the purpose of securing data on the following points: (1) The influence of washing sheep on the yield of grease and of scoured wool and on the rate of gain made by the sheep; and (2) the influence of the time of shearing on the yields of grease and of scoured wool and on the rate of gain made by the sheep.

PLAN OF THE EXPERIMENT

Early in March, 1911, 100 lambs born in April and May, 1910, were purchased and were divided into four lots as nearly alike as possible with respect to sex, weight and conformation. The experiment extended over a little more than 2 years, so that during its progress three clips of wool were removed, in 1911, 1912 and 1913.

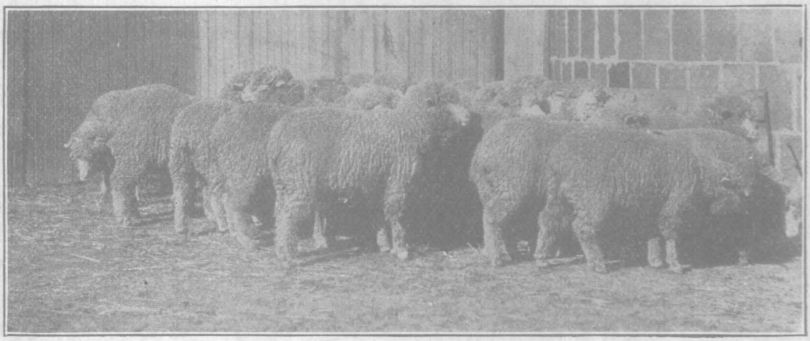
[1]The experiment reported in this bulletin was conducted on the farm of A. O. and Howard J. Campbell, Barnesville, Ohio. The author is glad to express his thanks to these gentlemen for their assistance not only in caring for the sheep, but in executing other details of the experiment.

The treatment of the lots with respect to washing and time of shearing was as follows:

Lot 1. Washed; shorn about April 12.
Lot 2. Unwashed; shorn about April 12.
Lot 3. Washed; shorn about June 1.
Lot 4. Unwashed; shorn about June 1.

Each lot was shorn as nearly as possible on the same date each year, so that with the exception of the 1911 clip the fleeces removed represent a variation of not more than 2 days from a year's growth.

A short time before being washed in 1913, one-half of the sheep in Lots 1 and 2 were shifted from one lot to the other, and a similar shift was made in Lots 3 and 4. This was done to overcome any inequality between lots that might have resulted from the original division. It was impossible to make any shift between the lots shorn in April and those shorn in June, and still secure a year's growth of wool.



Washed sheep, April, 1912

Unwashed sheep, April, 1912

Sheep used.—The sheep used in this experiment, like most of those in eastern Ohio, were practically purebred Merinos, although they were not recorded by any record association. They were comparatively free from wrinkles and should be classed in the C or light B types, commonly referred to as the Delaine type of Merinos. They had very dense fleeces which carried an unusually large amount of yolk for sheep of this type. They were unusually strong and rugged in constitution and were perhaps above the average with regard to weight and quality of fleece. Each lot contained 19 wethers and 6 ewes. The ewes were not bred during the experiment.

Management of the sheep.—Until the last winter of the experiment the sheep were managed with the object of keeping them in a healthy, growing condition rather than of fattening them. During the grazing season they were pastured on bluegrass without any grain, and during the winter they were fed corn silage and clover or alfalfa hay, with a light feed of corn. They were housed at night and on bad days, and were allowed the run of a dry barnyard on good days during the winter. During the latter part of the last winter of the experiment they were fed a heavier grain ration to have them ready for market at the close of the experiment, after the last two lots of sheep were shorn in June, 1913.

Washing and shearing.—The sheep were washed in a stream of sufficient swiftness to supply an abundance of clean water. Each sheep was held in the stream separately and the dirt squeezed out of the wool by hand. An attempt was made to do a thorough job of washing, but, because of the density of the fleeces and the large amount of yolk they carried, it is probable that the washed wool still contained more foreign matter than is usually contained in washed wool from more open-wooled sheep. After the sheep were washed, from 7 to 10 days were allowed to intervene before they were shorn, to allow the wool to dry out thoroughly.

The shearing was done with power-driven clippers which insured all the sheep being shorn with greater uniformity than is possible when they are shorn with hand shears.

Scouring[1] the wool.—Because of the limited capacity of the Station's wool-scouring equipment, only one-fourth of the fleeces shorn in 1911 and 1913 were scoured in the wool laboratory at Wooster. In selecting the fleeces to be scoured, an attempt was made to select those that were representative of each lot. The scouring was done by the emulsion process, similar to that used

[1] *Scouring* is a trade term for the process of cleansing wool from impurities, such as yolk, sand, dust, etc. *Scoured wool* is wool from which such impurities have been removed. *Grease wool* is wool as it comes from the sheep, whether or not it was washed before shearing.

commercially. The wool was put through three scouring liquors containing potash soap and potassium carbonate, of gradually diminishing strengths, and finally through a rinse of clear, warm water. The wool was dried to a constant weight at a temperature of 150° F. both before and after scouring, to overcome any differences in moisture content that might exist on different days. The entire 1912 clip was shipped to Cleveland and scoured in a commercial plant. Here the wool was put through three scouring liquors and a final rinse of clear, warm water. This wool was dried to a constant weight at 150° F. before it was shipped to Cleveland, and after it was scoured it was returned to Wooster and again dried to a constant weight at the same temperature.

INFLUENCE OF WASHING ON YIELD OF GREASE WOOL AND OF SCOURED WOOL

Table I shows the total amount and the average yield per head of grease and of scoured wool produced by each lot of sheep in 1912 and 1913. This table shows that the amount of loss in weight of fleece due to washing sheep before shearing depends somewhat upon the time of the year when the washing was done. When the sheep were washed, and then shorn April 12, the average for the 2 years showed a loss of only 1.49 pounds per fleece due to washing; but, when they were washed, and then shorn June 1, this loss was 2.64 pounds per fleece. This difference can perhaps be attributed to one or more of the following causes: (1) While the oil in wool is not readily soluble in water, it is quite probable that some of it is dissolved when the sheep are washed. As stated on page 315, it seems that the wool shorn June 1 contained more yolk and was thus liable to a greater loss of this material in washing than was the wool shorn April 12. (2) The higher atmospheric temperature may have made the yolk softer in June than in April, either rendering the yolk itself more soluble, or making it possible for the water to wash out more of the other impurities entangled in the yolk. It is probable that both factors were in operation. (3) The water in which the sheep were washed was warmer in June than in April, making it more effective in removing foreign matter from the wool.

It is possible, although not probable, that the shock and excitement due to washing might affect the health of the sheep to such an extent as to retard the growth of the wool the following year. The yield of scoured wool produced by the different lots, as presented in Table I, throws some light on this point. The average weight of scoured wool produced per head was practically the same for the washed and for the unwashed sheep shorn April 12, but when the

shearing was done June 1, the unwashed sheep produced 3.79 pounds, while the washed sheep produced only 3.62 pounds of scoured wool. These small and irregular differences can scarcely be regarded as an indication that washing the sheep was detrimental to the growth of the wool.

TABLE I.—GREASE AND SCOURED WOOL PRODUCED

Year	Sheep shorn April 12									
	Lot 1—Washed					Lot 2—Unwashed				
	Number	Grease†		Scoured‡		Number	Grease†		Scoured‡	
		Total	Average	Total	Average		Total	Average	Total	Average
		Lb.	Lb.	Lb.	Lb.		Lb.	Lb.	Lb.	Lb.
1912	25	269.80	10.79	98.39	3 94	24	288.10	12.00	92.37	3.85
1913	25	246.75	9.87	*25.04	3.58	23	267.25	11.62	*27.63	3.95
Av....	..	.... .	10 33	.....	3.86	..	.....	11.82	.....	3.87
	Sheep shorn June 1									
	Lot 3—Washed					Lot 4—Unwashed				
1912	25	265.70	10.63	89.98	3.60	24	330.50	13.77	93.99	3.92
1913	25	229.00	9.16	*25.93	3.70	24	271.00	11.29	*23.48	3.35
....	..	.....	9.89	.....	3.62	..	.....	12.53	.....	3.79

*Only 7 fleeces were scoured from each lot of the 1913 wool.
†Wool as removed from the sheep.
‡Wool scoured and dried to a constant weight at 150° F.

INFLUENCE OF WASHING ON RATE OF GAIN

Where washing sheep before shearing is practiced, a question is often raised as to whether washing is injurious to the health of the sheep. Table II, presenting the gains made by each lot for various periods after the sheep were washed and shorn, shows practically no difference in the rate of gain made by the sheep that were washed and by those that were not washed. This indicates that if washing was detrimental to the health of the sheep, the injury was not sufficiently great to influence the rate of gain after shearing, for the periods shown in the table. There was no evidence that washing was in any way injurious to the sheep.

TALBE II.—INFLUENCE OF WASHING ON RATE OF GAIN

Date of weighing	Sheep shorn April 12							
	Lot 1—Washed				Lot 2—Unwashed			
	Number	Weight	Total gain	Average gain	Number	Weight	Total gain	Average gain
		Lb.	Lb.	Lb.		Lb.	Lb.	Lb.
April 14, 1911	25	1,425	...	....	25	1,450	...	.....
June 12, 1911	25	1,665	240	9.6	25	1,685	235	9.40
April 15, 1912	25	1,865	...	....	24	1,765	...	.....
June 11, 1912	25	2,080	215	8.6	*23	1,925	220	9.51
April 15, 1912	25	1,865	...	....	24	1,765	...	.....
February 28, 1913	25	2,250	385	15.4	*23	2,020	315	13.68
April 22, 1913	25	1,975	...	....	23	1,810	...	.....
June 7, 1913	25	2,325	350	14.0	23	2,155	345	15.00
	Sheep shorn June 1							
	Lot 3—Washed				Lot 4—Unwashed			
June 12, 1911	25	1,525	...	....	25	1,555	...	.....
December 20, 1911	25	2,045	520	20.8	25	2,075	520	20.80
June 12, 1911	25	1,525	...	....	25	1,555	...	.....
March 18, 1912	25	2,125	600	24.0	25	2,175	620	24.80
June 11, 1912	25	1,930	...	....	24	1,910	...	.....
January 17, 1913	25	2,095	165	6.6	24	2,065	155	6.46
June 11, 1912	25	1 930	...	....	24	1,910	...	.....
February 28, 1913	25	2,080	150	6.0	24	2,075	165	6.87

*One sheep died April 22, 1912; weight 60 pounds.

INFLUENCE OF TIME OF SHEARING ON YIELD OF GREASE WOOL AND OF SCOURED WOOL

Everyone who is experienced in handling sheep has noted that when the weather gets warm in the spring, wool on the sheep becomes more greasy. One explanation of this is that during the cold winter months the yolk is harder and not as noticeable as it is after the warm weather has softened it into a more nearly liquid form, giving the wool a greasy feel and appearance, although there is thought to be no more oil actually present than there was during the winter. The more commonly accepted explanation, however, is that the coming of warm weather results in the presence of more yolk in the fleece, due to increased activity of the sebaceous glands or of the sweat glands, or of both. It is because of this belief that many sheepmen do not like to begin shearing until the weather becomes warm enough to "bring out the grease." The data presented in Table I furnish evidence to support the latter explanation.

From the figures in Table I, showing the average yield per head of grease wool for the 2 years, 1912 and 1913, it may be seen that

when the sheep were washed, those shorn April 12 produced 10.33 pounds, while those shorn June 1 produced 9.89 pounds of wool. When the sheep were not washed, those shorn April 12 produced 11.82 pounds, while those shorn June 1 produced 12.53 pounds of wool. When the sheep were washed there was an average difference of 0.44 pound of grease wool in favor of the sheep shorn April 12, but when the sheep were not washed there was an average difference of 0.71 pound of grease wool in favor of the sheep shorn June 1. The data presented in Table IV, page 319, help to explain these differences in yield of grease wool. Table IV shows that when the sheep were washed, the grease wool from those shorn April 12 yielded 40.63 percent, while the grease wool from those shorn June 1 yielded 38.65 percent of scoured wool, or a yield of 1.98 percent more scoured wool from the grease wool produced by the sheep shorn April 12. When the sheep were not washed, the grease wool from those shorn April 12 yielded 36.56 percent, while the grease wool from those shorn June 1 yielded 32.96 percent of scoured wool, or a yield of 3.6 percent more scoured wool from the grease wool produced by the sheep shorn April 12. The fact that the washed sheep shorn June 1 produced slightly less grease wool per head than did those shorn April 12, while the unwashed sheep shorn June 1 produced more grease wool per head than did those shorn April 12, with no corresponding increase, but rather with an actual decrease, in the amount of scoured wool, indicates that between the dates mentioned there was an increase in the proportion of matter other than wool fiber in the fleeces. The fact that the difference in favor of early shorn wool with respect to the yield of scoured wool was almost twice as great in case of the unwashed as in case of the washed wool, indicates that this additional amount of foreign matter was partly, but not entirely, removed when the sheep were washed. Since any increase in the proportion of foreign matter from outside sources was improbable at that time of the year, it seems fair to assume that this increase was due to an increased secretion of yolk or other substances from the skin of the sheep. The late washed sheep were carefully "tagged" or "breeched out" before they were turned to grass in the spring so that the increase in the amount of foreign material in the wool was not due to an accumulation of manure around the breech, which frequently forms when sheep are not shorn until late in the spring. Facilities were not at hand to determine the character of the material removed from each lot of wool when scoured to see if the wool shorn June 1 actually contained more of the products of the sebaceous and sweat glands than did

that shorn April 12. The increase in proportion of foreign matter in wool in the spring months is usually attributed by sheep raisers to an increased amount of oil, but since warm weather increases perspiration, it is reasonable to suppose that at least a part of this matter is composed of deposits of mineral salts, the residue from the evaporation of the perspiration.

While many sheep raisers do not like to shear in the spring until the weather becomes sufficiently warm to produce, as they think, the maximum amount of oil in the wool, there are others who have reasons for favoring early shearing. There is a more or less common belief that when sheep are shorn rather early in the spring—say late in March or early in April, while there yet remain a few weeks of cool weather—the wool grows more rapidly than it does if shearing is delayed until hot weather, and that if the sheep are properly housed they suffer no hardships from early shearing. There is also a belief that when sheep are shorn after the coming of the hot weather of late May and early June and are turned out to pasture, the hot sun "scalds" the skin of the newly shorn sheep, particularly if shorn close, and retards the growth of the wool the following year. Table I furnishes evidence to indicate that the time of year when the sheep are shorn has some influence upon the amount of wool produced. Since it is apparent from the data presented on page 319 that there is a difference in the proportion of materials other than wool fiber in wool shorn at different times during the spring, the scoured wool rather than the grease wool must be taken as a measure of the influence of the time of shearing upon the amount of wool fiber produced. It may be seen from Table I that, regardless of whether the sheep were washed, those shorn April 12 produced slightly more scoured wool than did those shorn June 1. While this difference of a fraction of a pound of scoured wool per head seems slight, yet when scoured Delaine wool is worth from 60 to 80 cents per pound, or even more, it may be seen that this difference is of no small financial consequence in a large flock. This point, however, will have but little practical bearing until there is evolved a system of buying wool which will take the amount of shrink into consideration more than does the present system and make it possible for growers to receive prices that are more nearly in keeping with the real value of their wool.

INFLUENCE OF TIME OF SHEARING ON RATE OF GAIN

It is commonly admitted, even by those who practice late shearing because of the supposedly greater weight of grease wool secured,

that sheep will thrive better and make larger gains if they are shorn before hot weather comes in the spring. Table III furnishes evidence to substantiate this opinion.

TABLE III.—INFLUENCE OF TIME OF SHEARING ON RATE OF GAIN

Date of weighing	Lots 1 and 2—Shorn April 12				Lots 3 and 4—Shorn June 1			
	Number	Weight	Total gain	Average gain	Number	Weight	Total gain	Average gain
		Lb	Lb.	Lb		Lb	Lb.	Lb
April 15, 1912	49	†3 630			49	‡4 060		
April 22, 1913	*48	†3,785	215	4 48	49	‡4,145	85	1 73
April 22, 1913	48	†3 785			49	‡4 145		
June 7, 1913	48	4 480	695	14 48	49	§4,795	650	13 27

*One sheep died April 22, 1912, weight 60 pounds
†Weighed soon after shearing
‡Weighed with the wool on
§Includes weight of wool removed June 1

Table III shows the total and average gains made by the early shorn and and by the late shorn sheep for the two periods, April 15, 1912 to April 21, 1913, inclusive, and April 22 to June 6, 1913, inclusive. These are the only periods for which it is possible to compare the gains owing to the fact that during the year 1911-12, two sheep died, and it was not possible to secure their weights at the time of death. Lots 1 and 2 were shorn on April 13, 1913, but they were not weighed until April 22. With the exception of the 9 days from April 14 to April 22, inclusive, Table III shows the gain made by Lots 1 and 2 during the year intervening between the time they were shorn in 1912 and the time they were shorn in 1913, but it does not show the gain made by Lots 3 and 4 between shearings in 1912 and 1913. It doubtless would be more desirable to show the gain made between shearings each year for the late shorn as well as for the early shorn sheep. In this case, however, such a comparison would be decidedly unfair to the early shorn sheep, because the sheep were all fed heavily between March 10 and June 7, 1913, to get them fat for market, and this period of heavy feeding constitutes a much greater percent of the period between shearings in case of the late shorn sheep than it constitutes of the corresponding period for the early shorn sheep.

Table III shows that between April 15, 1912, and April 22, 1913, the sheep shorn April 12 made an average gain of 4.48 pounds, while the average gain made by the sheep shorn June 1 was 1.73 pounds. Between April 22 and June 7, 1913, the early shorn sheep made an average gain of 14.48 pounds as compared with an average gain of 13.27 pounds made by the late shorn sheep. Beginning about

March 10, 1913, the sheep were fed heavily to fatten them for market, which accounts for the larger gains made between April 22 and June 7.

While the differences in rate of gain made by the early and by the late shorn sheep were not great, they favor shearing early enough to avoid hot weather in the spring.

Other things, not shown by this experiment, in favor of early shearing are the avoidance of much of the trouble from maggots which is likely to result if sheep are not shorn until late in the spring, and the elimination of "tagging" the sheep to prevent the wool around the breech from becoming soiled when the sheep are turned out to pasture.

YIELD OF SCOURED WOOL

Table IV shows the percent of scoured wool yielded by the grease wool from each lot for each of the 3 years. Since the wool shorn in 1911 was not a full year's growth, it is not included in the averages. It should be remembered that these percentage yields are based on the weights of both the grease and the scoured wool when dried to a constant weight at 150° F. This makes the yields somewhat higher than those secured by commercial wool scourers or manufacturers, who usually base their scouring percentages on the weight of the grease wool under ordinary atmospheric conditions, when the wool may contain from 8 to 15 percent of moisture, and upon the weight of the scoured wool as it comes hot from the dryers, with a low moisture content.

In studying the percentage of scoured wool yielded by the grease wool from washed and from unwashed sheep, as shown by the averages of the 2 years, 1912 and 1913, in Table IV, it may be seen that when the sheep were shorn April 12, the grease wool from the washed sheep yielded 40.63 percent of scoured wool, while the grease wool from the unwashed sheep yielded but 36.56 percent of scoured wool, or a yield of 4.07 percent more scoured wool from the grease wool produced by the washed sheep. When the sheep were shorn June 1, the grease wool from the washed sheep yielded 38.65 percent, while that from the unwashed sheep yielded but 32.96 percent of scoured wool, or a yield of 5.69 percent more scoured wool from the grease wool produced by the washed sheep. Attention is called to the fact that the difference in favor of washed wool with regard to the yield of scoured wool was greater in case of the wool shorn June 1 than in case of that shorn April 12. As has already been stated (p. 312), this is probably due to the warmer weather

and warmer water in June, making it possible to remove more foreign matter from the wool shorn June 1 than was removed from that shorn April 12.

TABLE IV.—YIELD OF SCOURED WOOL

Year	Sheep shorn April 12							
	Lot 1—Washed				Lot 2—Unwashed			
	Number fleeces scoured	Grease wool†	Scoured wool‡		Number fleeces scoured	Grease wool†	Scoured wool‡	
		Grams	Grams	Percent		Grams	Grams	Perc'nt
1911	5	*17 783 5	*7 800 5	*43 86	7	*27,645 0	*9 902 0	*35 82
1912	25	109 371 5	44 629 0	40 80	24	115 399 5	41,897 0	36 31
1913	7	28,436 0	11,358 5	39 94	7	33,491 0	12,531 0	37 42
Total or average 1912 and 1913		137 807 5	55 987 5	40 63		148,890 5	54,428 0	36 56
	Sheep shorn June 1							
	Lot 3—Washed				Lot 4—Unwashed			
1911	7	*30 252 0	*12 856 5	*42 50	6	*28,689 0	*9 777 0	*34 08
1912	25	106 973 5	40 812 5	38 15	24	129,217 0	42 631 0	32 99
1913	7	29,049 5	11 760 5	40 48	7	32,425 0	10,650.0	32 85
Total or average 1912 and 1913		136,023 0	52 573 0	38 65		161,642 0	53 281 0	32 96

*Not a full year s growth of wool and is not included in the averages
†Sorted and dried to a constant weight at 150° F
‡Scoured and dried to a constant weight at 150° F

Table IV shows a difference betwen early and late shorn wool with regard to the yield of scoured wool. This difference was 1.98 percent in case of the grease wool from the sheep that were washed and 3.6 percent in case of the grease wool from those that were not washed.

DOES WASHING SHEEP PAY FROM THE STANDPOINT OF EITHER MANUFACTURER OR WOOL GROWER?

In considering this question first from the standpoint of the manufacturer, it is extremely doubtful if washing sheep is in any way beneficial. Even if the sheep are washed before shearing, the wool must be scoured before it can be used, and the washing in no way lowers the cost of either the labor or materials used in scouring. One reason that is sometimes advanced to justify the custom of washing sheep is that washing removes a sufficient amount of dirt, particularly from the "dung locks" and "sweat tags" around the breech and belly to prevent the staining of the wool when it is

stored, thus making it whiter after it is scoured. In talking with a number of manufacturers who use both washed and unwashed wool, the writer has never heard this assertion confirmed. On the contrary, one manufacturer who uses washed wool extensively is authority for the statement that the washing of sheep in water of the low temperature of that used for this purpose seems to 'set" the dirt in the wool and to make it more difficult to remove in scouring.

All other things being equal, the prices paid by manufacturers for different lots of grease wool are based upon the estimated amount of scoured wool that will be yielded by each lot. When a manufacturer pays a premium for washed wool, he does so, not because the washing has made the fiber more valuable, but merely because he estimates that the washing has removed so much of the foreign matter that the wool will shrink enough less in scouring to enable him to pay the premium and still have the wool cost him the same per scoured pound as it would cost if it had not been washed. In other words, the manufacturer attempts to buy washed and unwashed wool at the same price per pound on a scoured wool basis. Table V shows the corresponding prices the manufacturer could have afforded to pay for the washed wool produced in this experiment with unwashed wool worth the prices indicated, and have each class of wool cost him the same on a scoured wool basis. Table V is computed from the average yield of scoured wool from each lot for the years 1912 and 1913, as shown in Table IV. Since not all wool, whether washed or unwashed, will shrink the same as that from the sheep used in this experiment, Table V should not be expected to show the exact relationship between the values of washed and unwashed wool that exists in all cases.

TABLE V.—COMPARATIVE VALUES OF WASHED AND UNWASHED WOOL (cents)

Based on sheep shorn April 12			Based on sheep shorn June 1		
When unwashed wool is worth the following prices per pound	Washed wool should be worth the following prices per pound	Premium which washed wool should command over unwashed wool	When unwashed wool is worth the following prices per pound	Washed wool should be worth the following prices per pound	Premium which washed wool should command over unwashed wool
20	22.23	2.23	20	23.45	3.45
22	24.45	2 45	22	25 80	3.80
25	27.78	2 78	25	29.32	4.32
27	30.01	3.01	27	31.66	4 66
30	33.34	3.34	30	35.18	5.18
33	36.67	3.67	33	38.70	5.70

The data presented in Table V offer but little encouragement for the wool grower to wash sheep before shearing. By means of the scale of prices given in this table the grower is able to tell pretty closely whether the premium offered for wool is sufficient to repay him for the loss in weight due to washing. The figures given in Table V make no allowance for the cost of washing. One thing that should be kept in mind is that the sheep used in this experiment carried denser and more oily fleeces than are carried by the average sheep of the State; consequently the washed wool shrank more in scouring. This results in a smaller "spread" in the prices for washed and for unwashed wool than would be expected in the case of more open-wooled sheep. On this account Table V shows approximately the minimum premium for washed wool which the grower can afford to receive and secure the same for his wool, on a scoured wool basis, as he would secure if the wool is not washed, when no allowance is made for the cost of washing.

In sections of the State where sheep are washed, they are usually washed and shorn in May or early June; consequently that part of Table V which deals with the sheep washed in June is perhaps the more nearly applicable to the sheep-washing proposition in Ohio. It may be seen from these figures that when a wool grower receives 20 or 33 cents per pound for unwashed Merino wool, he should receive 23.45 or 38.70 cents per pound, respectively, for the same wool if he washes it. These differences allow nothing for the cost of washing. A comparison of these figures with actual market prices reveals the fact that the relationship between the prices of washed and unwashed wool shown in Table V is very close to that which actually exists. At the present time (January 6, 1916) unwashed Delaine wool is quoted in Boston at 30 cents per pound while washed Delaine wool is quoted at 35 cents per pound. These figures indicate that the man who washes his sheep usually does not receive a price for his wool which is sufficient to pay him for washing, a task which is not only difficult and unpleasant, but which carries more or less danger both to the flock and to the owner.

Table IV shows that when the sheep were washed and shorn about April 12 there was not as great a loss from washing as resulted when the sheep were washed and shorn about June 1; consequently a smaller difference in price in the grease is necessary to keep the price of washed and unwashed wool on a par, on a scoured wool basis. This is illustrated in Table V. This fact cannot be used as an argument in favor of washing sheep at such times of the year or in such manner as will result in the wool being poorly

washed, with the intention of selling the wool at prices which are paid for wool that is properly washed. It should always be kept in mind that dealers and manufacturers know more than does the grower about the value of wools; and, if such practices as have just been described are followed generally enough to increase the average amount of shrinkage of washed wool, it is almost certain that manufacturers will lower the price so that it will be in keeping with the true value of the wool.

CONCLUSIONS

Effect of washing.—Washed sheep produced 1.49 pounds less grease wool per head when shorn April 12, and 2.64 pounds less per head when shorn June 1, than did unwashed sheep shorn on the same dates. Washing the sheep had practically no effect on the amount of scoured wool produced or on the rate of gain made by the sheep.

Wool shorn June 1, both washed and unwashed. shrank more in scouring than did wool shorn April 12.

The data yielded by this experiment indicate that, in many cases at least, not sufficient premium is paid for washed wool to cover the cost of washing and for the loss in weight of the wool.

Since washing sheep does not improve the quality of the wool fiber and does not diminish the cost of scouring, the practice is not beneficial to the manufacturer.

Early vs. late shearing.—Washed sheep shorn April 12 produced more grease wool than did washed sheep shorn June 1, while unwashed sheep shorn April 12 produced less grease wool than did unwashed sheep shorn June 1. This indicates that between these two dates there was an increase in weight of fleece due to the accumulation of a greater proportion of yolk or other foreign matter in the wool. Sheep shorn April 12, both washed and unwashed, produced slightly more scoured wool than did sheep shorn June 1. Sheep shorn April 12 made slightly greater gains than did sheep shorn June 1.